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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,036	09/12/2002	Yudong Zhu	122235	9589

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GLOBAL RESEARCH CENTER
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EXAMINER

FETZNER, TIFFANY A

ART UNIT	PAPER NUMBER
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2859

DATE MAILED: 09/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/065,036

Applicant(s)

ZHU ET AL.

Examiner

Tiffany A Feltzner

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 September 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09/12/2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

1. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: Component number 118 shown in Figure 1 is missing from applicant's disclosure. The examiner suggests inserting component number "118" on page 5 line 1, after the word "backplane".

3. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. **Claims 1-26** are rejected under **35 U.S.C. 103(a)** as being unpatentable over

Machida US patent application publication 2002/0115929 A1 published August 22nd

2002; with an effective filing date of September 21st 2001; in view of **Wang et al.**, US patent 5,928, 148 issued July 27th 1999.

7. With respect to **claim 1**, **Machida** teaches and shows "An imaging apparatus for producing Magnetic Resonance (MR) images of a subject" {See Figure 1}, "the apparatus comprising: a magnet assembly for producing a static magnetic field;" {See Figure 1 and page 2 paragraph [0039] through page 3 paragraph [0040]} "a gradient coil assembly for generating a magnetic field gradient for use in producing MR images;" {See Figure 1 and page 2 paragraph [0039] through page 3 paragraph [0043]} "at least one radio frequency (rf) coil array disposed about the subject for transmitting a radio frequency pulse and for detecting a plurality of magnetic resonance (MR) signals induced from the subject for a given imaging sequence;" {See RF coil 7 Figure 1 and page 2 paragraph [0039] through page 3 paragraph [0044]} "a positioning device for

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supporting the subject and for translating the subject during imaging;’ {See patient couch 17 and tabletop 17A of figure 1; page 1 paragraph [0006] through paragraph [0016]; page 2 paragraph [0039] through page 3 paragraph [0041]; and page 5 paragraph [0066 through page 7 paragraph [0108]] “a receiver for receiving the plurality of MR signals”, where the receiver is “adapted to adjust the respective center frequencies” for each slice from which a signals is acquired “at a rate commensurate with a rate of translation of the positioning device”. {See RF receiver 8R Figure 1 and page 2 paragraph [0039] through page 3 paragraph [0044] and page 5 paragraph [0066 through page 7 paragraph [0108]]}.

8. **Machida** lacks directly teaching that there are “a plurality of receivers”, configured in a similar manner to **Machida’s** disclosed receiver. However, **Machida** teaches multi-slice imaging for a plurality of regions while the object is continuously moved. {See page 1 paragraph [0016]}.and it would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the teaching of **Machida** to include a “a plurality of receivers”, because the ability to have a separate reception coil for each region over which imaging is to be conducted has been a well-known and conventionally usable technique in the MRI art for well over a decade. Additionally, **Wang et al.**, specifically teaches using an array or plurality of reception coils for imaging different areas of a subject while a patient is translated through a magnetic resonance device. {See abstract, figure 3, figure 4, figure 8; col. 2 line 59 through column 3 line 10; col. 6 lines 1-42} this reference shows that the use of plural reception coils (i.e. as in an array) is conventional.

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9. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the teaching of **Machida** which receives multiple signals with one reception coil; during patient translation with the teaching of **Wang et al.**, in combination, because **Wang et al.**, also acquires multiple imaging signals from a patient and teaches that the translation of the patient table into the field of view desired connects and disconnects successive local coil segments, from receiving signals; {See col. 2 line 59 through column 3 line 3.}, which directly suggests that the ability to detect multiple signals, while a patient is translated in an MR device, is readily performed by both a single reception coil, or a plurality of coils. The examiner notes that the specific MR application, cost, desired SNR or other factors conventionally determine the type of implementation on either an application or cost effective basis. The examiner also notes that simply increasing the number of reception coils is **not** a novel, non-obvious modification, because substituting an array of coils for a single coil; or a single coil for a plurality of coils, is a readily obvious modification to an individual of ordinary skill in the art.

10. With respect to **Method claim 9**, **Machida** teaches and / or shows "A method for producing an image from an extended volume of interest within a subject using a Magnetic Resonance Imaging (MRI) system where the extended volume of interest is larger than an imaging portion of a magnet within the MRI system", {See page 1 paragraph [0005] through page 2 paragraph [0021]; page 4 paragraph [0055] through page 5 paragraph [0066]} "the method comprising: translating the volume using a positioning device along an axis of the MRI system and imaging portions of the volume

when they are within the imaging portion of the magnet,” {See Figures 1, 4a through 4d; page 1 paragraph [0005]; page 1 paragraph [0015 through page 2 paragraph [0021] page 4 paragraph [0055] through page 5 paragraph [0066]}. **Machida** also teaches and / or shows “detecting a plurality of MR signals from at least one radio frequency (RF) coil array for a given field-of-view within the MRI system as the positioning device is translating the volume,” {See Figures 1, 4a through 4d; page 1 paragraph [0005]; page 1 paragraph [0015 through page 2 paragraph [0021] page 4 paragraph [0055] through page 5 paragraph [0066]}. “sending the plurality of MR signals to a” receiver, (i.e. See Figure 1) with the receiver “adapted to adjust the respective center frequency at a rate commensurate with a rate of translation of the positioning device”, {See Figure 1; page 2 paragraph [0033] through page 3 paragraph [0044] and page 5 paragraph [0066] through page 7 paragraph [0108].} Additionally, **Machida** also teaches and / or shows “computing a plurality of respective sub-images corresponding to the plurality MR signals for the” receiver “and for the given field-of-view (FOV) at a plurality of incremented locations of the subject; and, combining the plurality of respective sub-images to form a composite image of the volume of interest.” {See Figures 4a through 4d; page 2 paragraph [0018]; page 3 paragraph [0044] through paragraph [0050]; page 4 paragraph [0055] through page 6 paragraph [0088]}.

11. **Machida** lacks directly teaching that there are “a plurality of receivers” configured in a similar manner to **Machida’s** disclosed receiver. However **Machida** teaches multi-slice imaging for a plurality of regions while the object is continuously moved. {See page 1 paragraph [0016]}.and it would have been obvious to one of ordinary skill in the art at

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the time that the invention was made to modify the teaching of **Machida** to include a "a plurality of receivers", because the ability to have a separate reception coil for each region over which imaging is to be conducted has been a well-known and conventionally usable technique in the MRI art for well over a decade. Additionally, **Wang et al.**, specifically teaches using an array or plurality of reception coils for imaging different areas of a subject while a patient is translated through a magnetic resonance device. {See abstract, figure 3, figure 4, figure 8; col. 2 line 59 through column 3 line 10; col. 6 lines 1-42} this reference shows that the use of plural reception coils (i.e. as in an array) is conventional.

12. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the teaching of **Machida** which receives multiple signals with one reception coil; during patient translation with the teaching of **Wang et al.**, in combination, because **Wang et al.**, also acquires multiple imaging signals from a patient and teaches that the translation of the patient table into the field of view desired connects and disconnects successive local coil segments, from receiving signals; {See col. 2 line 59 through column 3 line 3.}, which directly suggests that the ability to detect multiple signals, while a patient is translated in an MR device, is readily performed by both a single reception coil, or a plurality of coils. The examiner notes that the specific MR application, cost, desired SNR or other factors conventionally determine the type of implementation on either an application or cost effective basis. The examiner also notes that simply increasing the number of reception coils is **not** a novel, non-obvious modification, because substituting an array of coils for a single coil; or a single coil for a

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plurality of coils, is a readily obvious modification to an individual of ordinary skill in the art. The same reasons for rejection, obviousness, and motivation to combine, that apply to **claim 1** also apply to **claim 9**.

13. With respect to **Method claim 18**, **Machida** teaches and / or shows "A method for imaging an extended volume of interest within a subject using a Magnetic Resonance Imaging (MRI) system" {See page 1 paragraph [0005] through page 2 paragraph [0021]; page 4 paragraph [0055] through page 5 paragraph [0066]} "comprising: translating the subject into an imaging portion of a magnet assembly of the MRI system;" {See abstract, figure 1; page 3 paragraph [0041]; page 4 paragraphs [0055] through [0057]. "detecting a plurality of MR signals from a radio frequency (RF) coil array;" {See Figures 1, 4a through 4d; page 1 paragraph [0005]; page 1 paragraph [0015 through page 2 paragraph [0021] page 4 paragraph [0055] through page 5 paragraph [0066]}. "and, sending the plurality of MR signals to a" receiver, (i.e. receiver 8R of Figure 1) "the receiver being adapted to adjust a respective 'center frequency "'at a rate commensurate with a rate of translation of the positioning device;" {See Figure 1; page 2 paragraph [0033] through page 3 paragraph [0044] and page 5 paragraph [0066] through page 7 paragraph [0108]}.

14. **Machida** teaches and / or shows the step of "reconstructing at least one image of the volume of interest by computing a plurality of respective sub-images corresponding to the plurality MR signals" from the receiver "and for the given field-of-view (FOV) at a plurality of incremented locations of the subject as the subject is translated and combining the plurality of respective sub-images to form a composite image of the

volume of interest.” (i.e. a image of a patients abdomen). {See Figures 1, 4a through 4d; 7A, 7b; page 4 paragraph [0048] through paragraph [0064]; page 2 paragraph [0018]}

The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 9** also apply to **claim 18**.

15. **Machida** lacks directly teaching that there are “a plurality of receivers”, configured in a similar manner to **Machida’s** disclosed receiver, however **Machida** teaches multi-slice imaging for a plurality of regions while the object is continuously moved. {See page 1 paragraph [0016]}.and it would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the teaching of **Machida** to include a “a plurality of receivers”, because the ability to have a separate reception coil for each region over which imaging is to be conducted has been a well-known and conventionally usable technique in the MRI art for well over a decade. Additionally, **Wang et al.**, specifically teaches using an array or plurality of reception coils for imaging different areas of a subject while a patient is translated through a magnetic resonance device. {See abstract, figure 3, figure 4, figure 8; col. 2 line 59 through column 3 line 10; col. 6 lines 1-42} this reference shows that the use of plural reception coils (i.e. as in an array) is conventional.

16. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the teaching of **Machida** which receives multiple signals with one reception coil; during patient translation with the teaching of **Wang et al.**, in combination, because **Wang et al.**, also acquires multiple imaging signals from a patient and teaches that the translation of the patient table into the field of view desired

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connects and disconnects successive local coil segments, from receiving signals; {See col. 2 line 59 through column 3 line 3.}, which directly suggests that the ability to detect multiple signals, while a patient is translated in an MR device, is readily performed by both a single reception coil, or a plurality of coils. The examiner notes that the specific MR application, cost, desired SNR or other factors conventionally determine the type of implementation on either an application or cost effective basis. The examiner also notes that simply increasing the number of reception coils is **not** a novel, non-obvious modification, because substituting an array of coils for a single coil; or a single coil for a plurality of coils, is a readily obvious modification to an individual of ordinary skill in the art.

17. With respect to apparatus **claim 2**, and **corresponding method claims 10**, and **21** which depend respectively from **independent apparatus claim 1**, and **independent method claims 9**, and **18**; **Machida** teaches and shows that "the at least one rf coil array is mounted on a fixture that is disposed about the subject. {See RF receiver 8R Figure 1} The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 9, and 18** also apply to **claims 2, 10, and 21**.

18. With respect to apparatus **claim 3**, and **corresponding method claims 11**, and **22** which depend respectively from **independent apparatus claim 1**, and **independent method claims 9**, and **18**; **Machida** teaches and shows that "the fixture and rf coil array mounted thereon are stationary relative to the static magnetic field." {See RF receiver 8R Figure 1} The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 2, 9, 10, 18, and 21** also apply to **claims 3, 11 and 22**.

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19. With respect to apparatus **claim 4**, and **corresponding method claims 12**, and **23** which depend respectively from **independent apparatus claim 1**, and **independent method claims 9**, and **18**; **Machida** lacks directly teaching that “the fixture and rf coil array mounted thereon are moveable relative to the static magnetic field.” However, **Wang et al.**, teaches that this limitation is an alternative configuration with a plurality of reception coils. {See col. 6 lines 18-51} Therefore, because the substitution of a plurality of receiver coils for a single receiver coil is well known, {See the rejection of claim 1} the modification taught by **Wang et al.**, when using a plurality of reception coils would also have been obvious to one of ordinary skill in the art at the time that the invention was made. The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 2, 9, 10, 18**, and **21** also apply to **claims 4, 12** and **23**.

20. With respect to apparatus **claim 5**, and **corresponding method claims 13**, and **20** which depend respectively from **independent apparatus claim 1**, and **independent method claims 9**, and **18**; **Machida** shows “the at least one rf coil array comprises a plurality of coil elements arranged in a orthogonal distribution relative to a frequency encoding direction” {See Figure 1, where the frequency encoding direction “X” is “arranged in a orthogonal distribution” to the RF coil 7 which gets signals from multiple slices.}. Because RF coil 7 acquires signals from a plurality of slice locations RF coil 7 broadly constitutes “at least one rf coil array, with a plurality of coil elements”. {See Figures 1, 4a through 4d, 7A, 7b}. The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 9**, and **18** also apply to **claims 5, 13** and **20**.

21. With respect to apparatus **claim 6**, and **corresponding method claims 14**, and **24** which depend respectively from **independent apparatus claim 1**, and **independent method claims 9**, and **18**; **Machida** teaches and shows that “at least one rf coil array detects the MR signals concurrently with the translation of the positioning device”. {See RF receiver coil 18R page 1 paragraph [0015] through paragraph [0016]; page 4 paragraph [0057] through paragraph [0058]}. The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 9**, and **18** also apply to **claims 6, 14** and **24**.

22. With respect to **claim 7**, **Machida** teaches and shows that “an image processor” {See Figure 1 Host computer 6 and calculator controller 10} “for computing a plurality of respective sub-images corresponding to a field-of-view at a plurality of incremented locations of the subject and wherein the image processor is further adapted to combine the plurality of respective sub-images to form a composite image of the subject.” [See Figures 4A through 4d; 7A, 7b; page 3 paragraph [0045] through page 5 paragraph [0065] Additionally, **Wang et al.**, also teaches this limitation {See col. 3 lines 4-10; image processor 106 and array processor 161 from Figure 1}. The same reasons for rejection, obviousness, and motivation to combine, that apply to **claim 1** also apply to **claim 7**.

23. With respect to **claim 8**, **Machida** teaches and shows that “the imaging sequence is one of multi-slice, multi-slab, and volume imaging sequences.” {See figures 2, 4a through 4d, 7a, 7b page 1 paragraphs [0002] and [0005]; and the entire reference in general as this limitation is taught throughout the reference repeatedly.} The same

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reasons for rejection, obviousness, and motivation to combine, that apply to **claim 1** also apply to **claim 2**.

24. With respect to **method claim 15**, and **corresponding method claims 25**, which depend respectively from **independent method claim 9**, and **independent method claim 18**; **Machida** teaches and shows that "the translating step is repeated until a selected length of the subject has been imaged inside the imaging portion of the magnet." {See Figures 1, 4a through 4d; page 1 paragraph [0005]; page 1 paragraph [0015 through page 2 paragraph [0021] page 4 paragraph [0055] through page 5 paragraph [0066]}. The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 9, and 18** also apply to **claims 15 and 25**.

25. With respect to **method claim 16**, **Machida** teaches and shows that "the combining step further comprises combining a central portion of each sub-image to form the composite image." {See Figures 4a through 4d; Figure 6 page 6 paragraphs [0095] through [0099] and ; and page 4 paragraph [0055] through page 6 paragraph [0099] in general.}. The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, and 9** also apply to **claim 16**.

26. With respect to **method claim 17**, and **corresponding method claims 19**, which depend respectively from **independent method claim 9**, and **independent method claim 18**; **Machida** teaches and shows that "the extended volume of interest" (i.e. of a patients abdomen which extends beyond the fixed range of the single multislice RF coil array), acquires slices as the patient is translated into the MR device in a "head-to-toe" direction, {See Figures 4a through 4d, which show that the slices move in a

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head-to-toe direction down the patient; and the teachings of page 4 paragraph [0055] through page 6 paragraph [0088] and page 1 paragraph [0005] through page 2 paragraph [0021]]. The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 9, and 18** also apply to **claims 17 and 19**.

27. With respect to **method claim 26**, **Machida** teaches and shows that "the translating step is substantially continuous". {See abstract, page 1 paragraphs [0002], [0005] through [0016]; page 3 paragraph [0041] and the entire reference in general as substantially continuous translation of the patient is a main goal of the **Machida** reference. The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 9, and 18** also apply to **claim 26**.

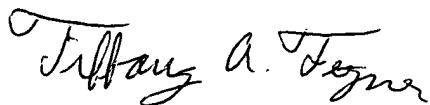
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Conclusion

28. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is (703) 305-0430. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

29. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached on (703) 308-3875. The fax phone number for the organization where this application or proceeding is assigned is (703)305-3432 .

30. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0956.



TAF
September 5, 2003



Diego Gutierrez
Supervisory Patent Examiner
Technology Center 2800